A stator for electric motors

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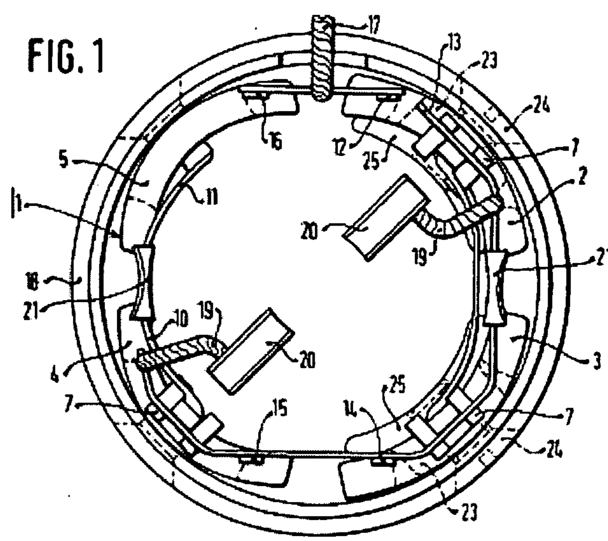
Abstract of **GB2032708**

Individual excitation windings (2 to 5) are constructed so as to be arched, considered in radial section through the casing (18), to a greater extent than the inner surface of the casing and also to be resilient in a direction radially of the longitudinal axis of the casing whereby, when fixed to the pole casing by respective poles (23) received in central apertures therein (only two poles shown in position), the individual windings are bent back to a certain extent so as to conform more to the curvature of the inner surface of the casing. The spring force thereby generated in the winding serves to assist in mounting the windings in a shake- proof manner in the casing (18) whereby to obviate the necessity for additional mounting members necessary hitherto.

FIG. 1



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(54) A stator for electric motors

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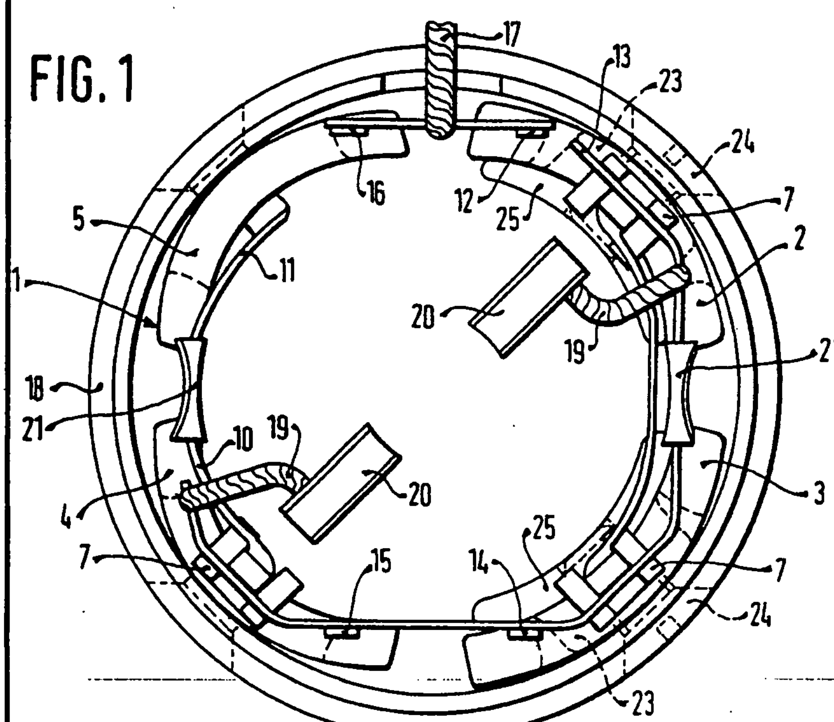
FIG. 1



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SPECIFICATION

A stator for electric motors

The invention is concerned with stators for electric motors.

A stator for electric motors is already known whose individual windings forming the excitation winding are held in their arched shape by crosspieces. The curvature of the individual windings is adapted to the internal diameter of the pole casing in which the excitation winding is housed. The crosspieces basically compensate for the tolerance between the pole casing and the individual windings and between the individual windings and the poles which extend through the individual windings, are fixed in the pole casing and hold the excitation winding in the pole casing. However, the crosspieces, even with a layer of insulating material which completely encloses the excitation winding, are not always adequate for the task of tolerance compensation to achieve a highly shakeproof arrangement of the excitation winding in the pole casing such as is necessary, for example, for starting motors suitable for the rough operating conditions encountered in motor vehicles.

In accordance with the present invention, there is provided a stator for an electric motor having a plurality of poles and an excitation winding which is formed from individual windings associated with the poles and housed in a pole casing, the individual windings being arched, when considered in radial section through the casing, to a greater extent than the inner surface of the pole casing, the winding ends of the individual windings and connection pieces between the individual windings lying in a position-constant manner relative to the inner surface of the pole casing, and the excitation winding with the winding ends and connection pieces, including a current-collecting rail, being enclosed on all sides with a unitary resilient coating of insulating material.

Such a stator has, by comparison with the known stators, the advantage that as a result of overarched individual windings it is possible to dispense with the crosspieces and the individual windings connected to an excitation winding can be housed firmly enough between the poles and the pole casing to provide a highly shakeproof construction. Furthermore, such a stator can be economically mass-produced.

It is particularly advantageous that the individual windings are constructed resiliently relative to the longitudinal axis of the excitation winding and yet the excitation winding only requires one completely enclosing insulating layer.

The invention is described further hereinafter by way of example, with reference to the accompanying drawings in which:

Figure 1 shows a stator in accordance with the invention seen from one front end, the left half of this figure having only an excitation winding inserted in the pole casing and the right half having an excitation winding fixed by means of poles;

Figure 2 shows the excitation winding in longitudinal section; and

Figure 3 is a section to an enlarged scale on the line III–III of Fig. 2.

With reference to the drawings, an excitation winding 1 is formed from four individual windings 2, 3, 4, 5. The individual windings 2 to 5 are wound from non-insulated flat wire having paper strips 6 inserted between the individual windings (Fig. 3). A pickup fork 7 made from insulating synthetic material is inserted at the end of each of the individual windings 2 to 4. The individual windings 2 and 3 are connected by their winding starts 8 and 9 which are hard-soldered together, the individual windings 4 and 5 being similarly connected by their windings starts 10 and 11. One end of a current-collecting rail 13 inserted in the pickup forks 7 of the individual windings 2, 3 and 4 is hard-soldered onto the end 12 of the individual winding 2, said end of the rail being separated prior to insulation. The winding end 14 of the individual winding 3 and the winding end 15 of the individual winding 4 are also hard-soldered onto the current-collecting rail 13. Like the winding end 12, the winding end 16 of the individual winding 5 is hard-soldered by means of the separated end of the current-collecting rail 13 to a current supply strand 17 whose other end is provided with a connecting lug (not shown in detail). The winding starts 8 to 11 and the winding ends 12, 14, 15 and 16 are "position constant". This means that each of the winding starts 8, 9 and 10, 11 are connected to each other, the winding ends 14 and 15 are connected to the current-collecting rail 13 and the winding ends 12 and 16 are connected to the current supply cable 17 in such a way that they remain at a constant distance from the inner edge of a pole casing 18, in which the excitation winding 1 is to be inserted, irrespective of the curvature of the individual windings 2 to 5. The individual windings 2 to 5, before the assembly of the excitation winding 1, are arched substantially more than is required by the internal diameter of the pole casing 18. The cable strands 19 of the positive brushes 20 for a commutator (not shown in detail) are also hard-soldered onto the current-collecting rail 13. An insulating sleeve 21 is placed around each portion of the current-collecting rail 13 between the pickup forks 7 of the individual windings 2 and 3 as well as 4 and 5 as an additional insulating protection against tie rods (not shown in detail) which lie in these regions.

The completely pre-assembled excitation winding 1 is enclosed on all sides with an

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insulating layer up to the line 22 of Fig. 2. The insulating layer, which is applied onto the excitation winding 1, for example, by a dipping process, is relatively thin and resilient. Apart from the individual windings 2 to 5 which form the excitation winding 1, it protects all the connection points with the winding starts 8 to 11 and the winding ends 12, 14, 15, 16 and the current-collecting rail 13.

The excitation winding 1 is fixed in the pole casing 18 by means of four poles 23 which are each screwed by means of a screw 24 in the pole casing 18. For this purpose, before the excitation winding 1 is inserted into the pole casing 18, a pole 23 is inserted in each individual winding 2 to 5. By means of the screws 24 which are screwed from outside through the pole casing 18 into the poles 23, the poles 23 are drawn firmly against the inner wall of the pole casing 18. In so doing, the pole lugs 25 urge the excess curvature of the individual windings 2 to 5 back until the individual windings 2 to 5 and therefore the excitation winding 1 are disposed in a shake-proof manner on the poles 23 in the pole casing 18. At the same time the over-arched individual windings 2 to 5, because of the spring force they attain through over-arching, also compensate for radial tolerances between the pole casing 18 and the pole lugs 25, the individual windings being constructed so as to be resilient in a direction radially of the longitudinal axis of the excitation winding. The position-constant winding starts 8 to 11 and winding ends 12, 14 to 16 remain like the current-collecting rail 13 undisturbed by the slight backward curving of the individual windings 2 to 5 when the excitation winding is fixed in the pole casing 18.

CLAIMS

1. A stator for an electric motor having a plurality of poles and an excitation winding which is formed from individual windings associated with the poles and housed in a pole casing, the individual windings being arched, when considered in radial section through the casing, to a greater extent than the inner surface of the pole casing, the winding ends of the individual windings and connection pieces between the individual windings lying in a position-constant manner relative to the inner surface of the pole casing, and the exitation winding with the winding ends and connection pieces, including a current-collecting rail, being enclosed on all sides with a unitary resilient coating of insulating material.

2. A stator as claimed in claim 1 in which the excitation winding, which is made up of individual windings which are formed from non-insulated flat wire, including the connection points for current supply and carbon brush leads, is completely enclosed by the insulating material.

3. A stator for an electric motor substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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FIG. 1

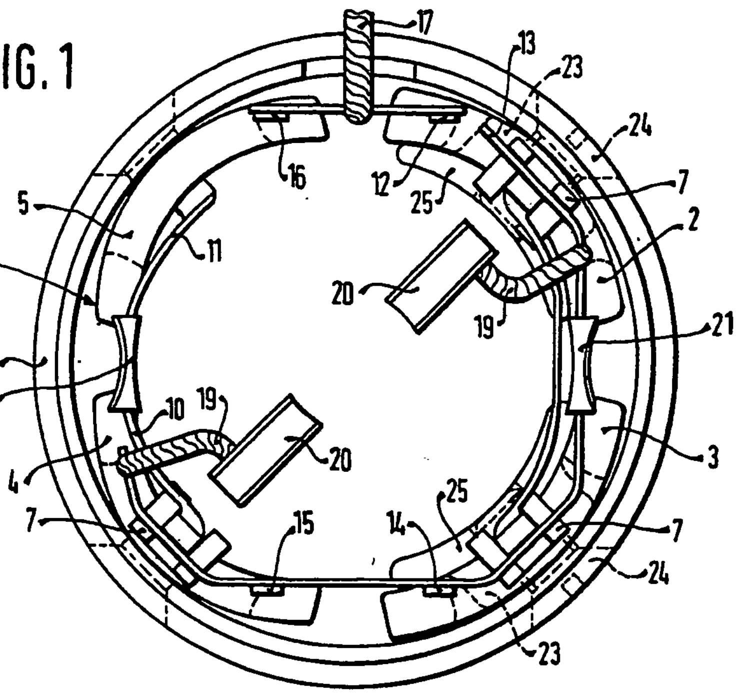


FIG. 2

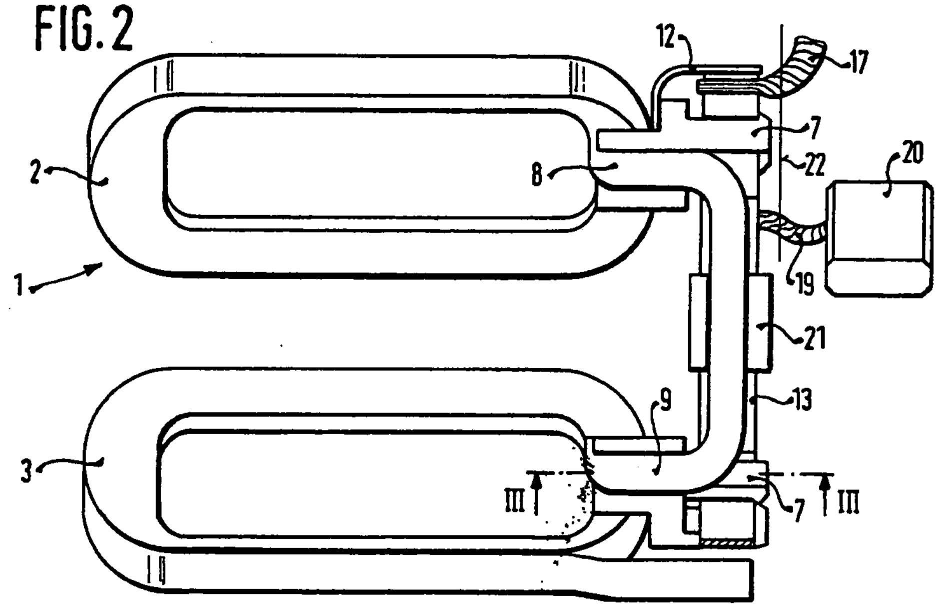
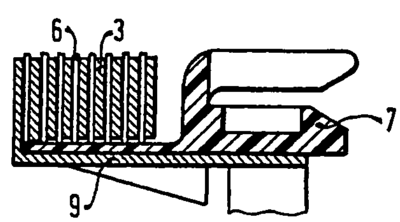


FIG. 3



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